

WHAT IS CLAIMED IS:

1. A high withstand voltage field effect type semiconductor device comprising:

a body region arranged in a semiconductor substrate;

5 a gate electrode facing to the body region;

a drift region arranged below the body region in the semiconductor substrate, the drift region being in conduction type opposite to the body region; and

10 a field dispersion region arranged between the body region and the drift region, the field dispersion region being in conduction type same as the drift region and having low net impurity concentration.

2. A high withstand voltage field effect type

15 semiconductor device according to claim 1 wherein:

the gate electrode is trench-structured; and

the field dispersion region is formed extending to bottom of the gate electrode.

20 3. A high withstand voltage field effect type semiconductor device according to claim 1:

further comprising emitter regions arranged discretely at opposite side of the drift region with the body region arranged between the emitter regions and the drift region, the emitter regions being in conduction type opposite to the body region, and

25 wherein field dispersion regions are arranged discretely corresponding to the emitter regions.

4. A high withstand voltage field effect type semiconductor device according to claim 2:

further comprising emitter regions arranged
5 discretely at opposite side of the drift region with the body region arranged between the emitter regions and the drift region, the emitter regions being in conduction type opposite to the body region, and

wherein field dispersion regions are arranged
10 discretely corresponding to the emitter regions.

5. A high withstand voltage field effect type semiconductor device according to claim 1 further comprising:

15 a buffer region arranged at opposite side of the body region with the drift region arranged between the buffer region and the body region, the buffer region being in conduction type same as the drift region; and

a second field dispersion region arranged between
20 the drift region and the buffer region, the second field dispersion region being in conduction type same as the drift region and having low net impurity concentration.

6. A high withstand voltage field effect type
25 semiconductor device according to claim 2 further comprising:

a buffer region arranged at opposite side of the body region with the drift region arranged between the buffer

region and the body region, the buffer region being in conduction type same as the drift region; and

5 a second field dispersion region arranged between the drift region and the buffer region, the second field dispersion region being in conduction type same as the drift region and having low net impurity concentration.

7. A high withstand voltage field effect type semiconductor device according to claim 3 further comprising:

10 a buffer region arranged at opposite side of the body region with the drift region arranged between the buffer region and the body region, the buffer region being in conduction type same as the drift region; and

15 a second field dispersion region arranged between the drift region and the buffer region, the second field dispersion region being in conduction type same as the drift region and having low net impurity concentration.

20 8. A high withstand voltage field effect type semiconductor device according to claim 4 further comprising:

25 a buffer region arranged at opposite side of the body region with the drift region arranged between the buffer region and the body region, the buffer region being in conduction type same as the drift region; and

a second field dispersion region arranged between the drift region and the buffer region, the second field

dispersion region being in conduction type same as the drift region and having low net impurity concentration.

9. A high withstand voltage field effect type

5 semiconductor device according to claim 5:

further comprising a collector region arranged at opposite side of the drift region with the buffer region arranged between the collector region and the drift region, the collector region being in conduction type opposite to
10 the drift region; and

wherein net impurity concentration of the buffer region is same as or lower than half of net impurity concentration of the collector region.

15 10. A high withstand voltage field effect type semiconductor device according to claim 6:

further comprising a collector region arranged at opposite side of the drift region with the buffer region arranged between the collector region and the drift region,
20 the collector region being in conduction type opposite to the drift region; and

wherein net impurity concentration of the buffer region is same as or lower than half of net impurity concentration of the collector region.

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11. A high withstand voltage field effect type semiconductor device according to claim 7:

further comprising a collector region arranged at

opposite side of the drift region with the buffer region arranged between the collector region and the drift region, the collector region being in conduction type opposite to the drift region; and

5 wherein net impurity concentration of the buffer region is same as or lower than half of net impurity concentration of the collector region.

12. A high withstand voltage field effect type
10 semiconductor device according to claim 8:

 further comprising a collector region arranged at opposite side of the drift region with the buffer region arranged between the collector region and the drift region, the collector region being in conduction type opposite to
15 the drift region; and

 wherein net impurity concentration of the buffer region is same as or lower than half of net impurity concentration of the collector region.

20 13. A high withstand voltage field effect type semiconductor device according to claim 5,

 wherein thickness of the buffer region is smaller than dispersion length of minority carrier.

25 14. A high withstand voltage field effect type semiconductor device according to claim 6,

 wherein thickness of the buffer region is smaller than dispersion length of minority carrier.

15. A high withstand voltage field effect type semiconductor device according to claim 7,

wherein thickness of the buffer region is smaller
5 than dispersion length of minority carrier.

16. A high withstand voltage field effect type semiconductor device according to claim 9,

wherein thickness of the buffer region is smaller
10 than dispersion length of minority carrier.

17. A high withstand voltage field effect type semiconductor device according to claim 10,

wherein thickness of the buffer region is smaller
15 than dispersion length of minority carrier.

18. A high withstand voltage field effect type semiconductor device according to claim 11,

wherein thickness of the buffer region is smaller
20 than dispersion length of minority carrier.

19. A high withstand voltage field effect type semiconductor device according to claim 5,

further comprising a carrier lifetime control region
25 including at least the buffer region.

20. A high withstand voltage field effect type semiconductor device according to claim 1,

wherein thickness of the field dispersion region is same as or longer than 1 μm .